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A44B 18/00

(52) UK CL (Edition S)
E2S SA

(56) Documents Cited
GB 2291114 A EP 0324577 A1 US 4709453 A
US 4169303 A

(58) Field of Search
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INT CL⁷ A44B 18/00

(54) Abstract Title
Hook structure for hook-loop fastening

(57) A hook for a hook-loop fastening is substantially T-shaped and upwardly tapered from a base 31 to form a neck section 32. Two hooks 33 extend outwards, with a recess 34 between them. The lower surfaces 36 of the two hooks are substantially planar, allowing more loops to be hooked on than with prior art hooks, so fewer hooks are needed. This, and the fact that the hook is shorter than in the prior art, allows a reduction in the amount of material required. The hook also gives a greater transverse pulling strength.

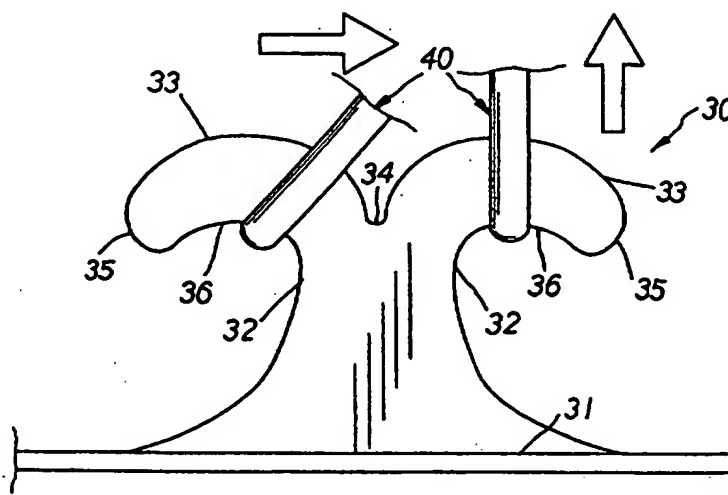


FIG. 3

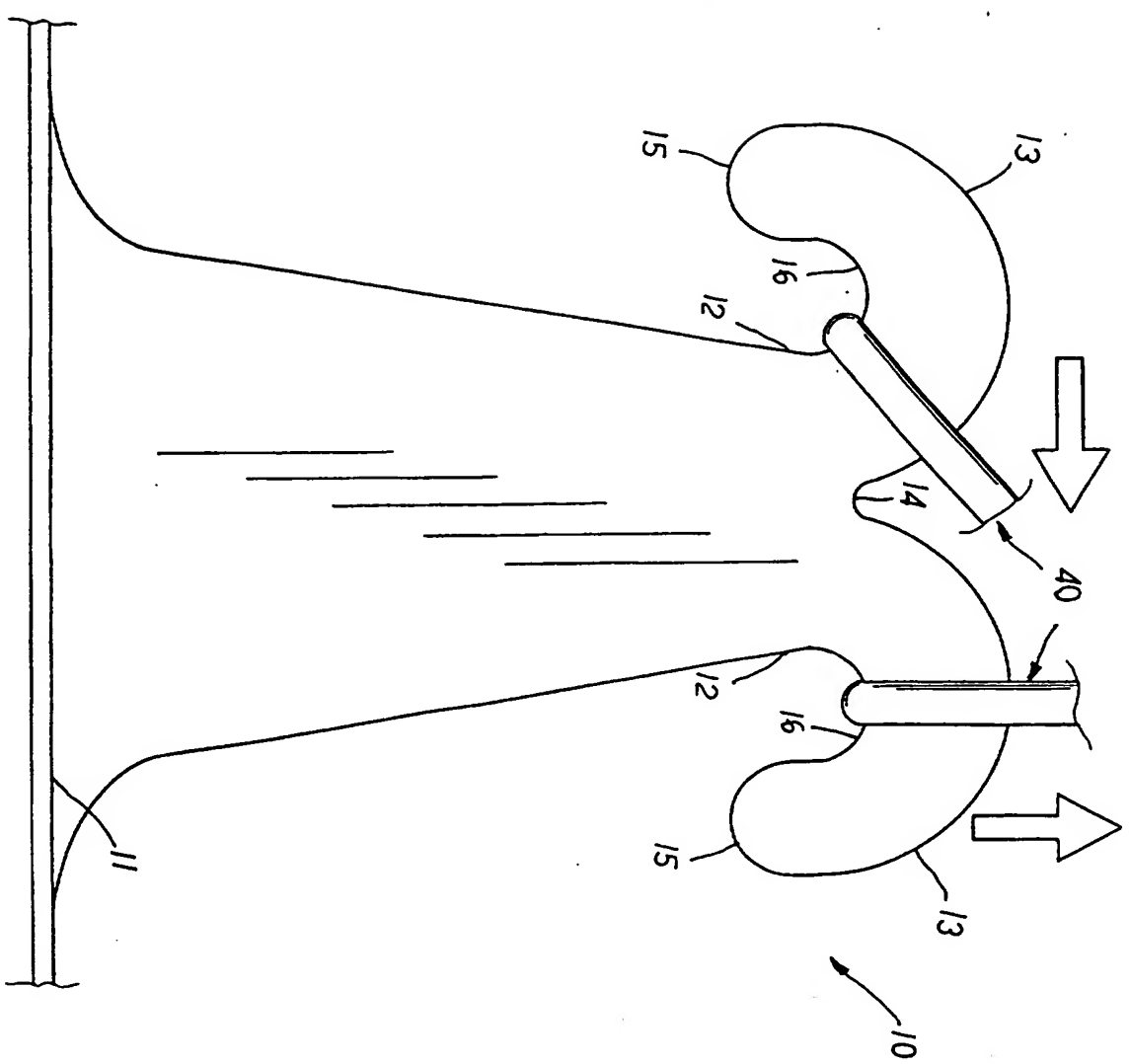


FIG. 1

PRIOR ART

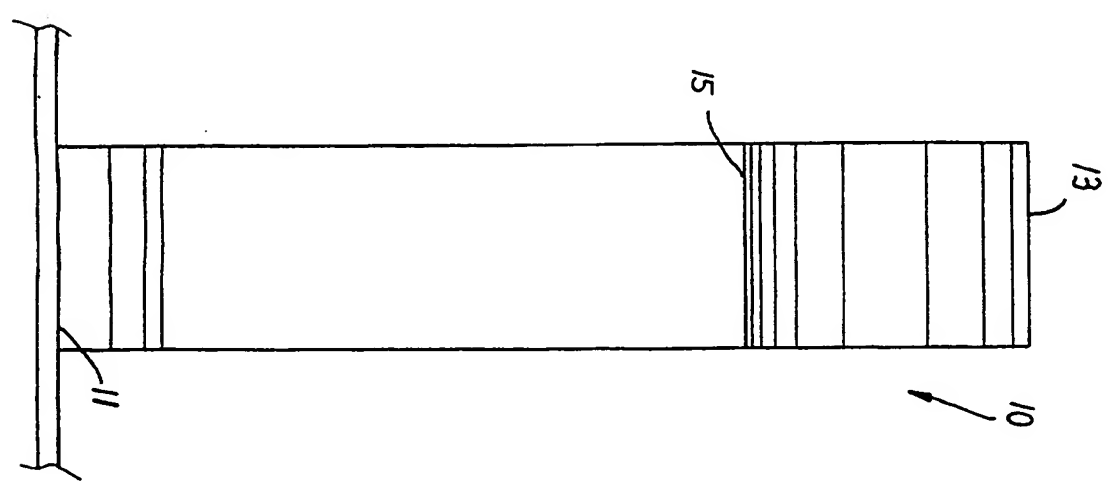


FIG. 1A

PRIOR ART

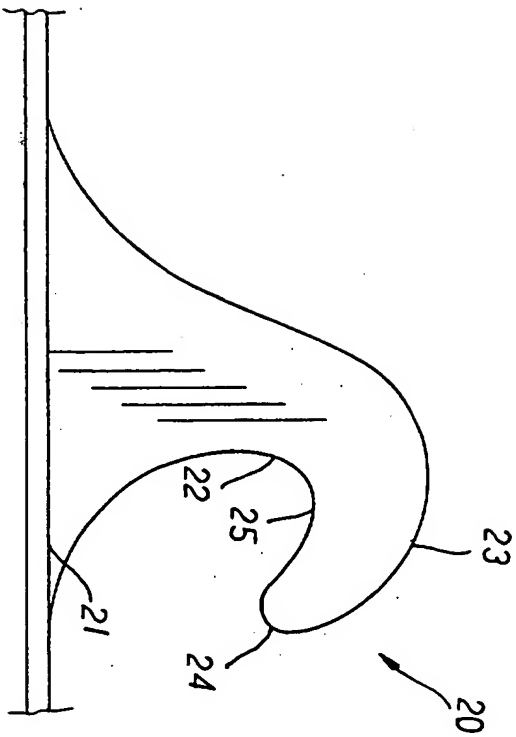


FIG. 2 PRIOR ART

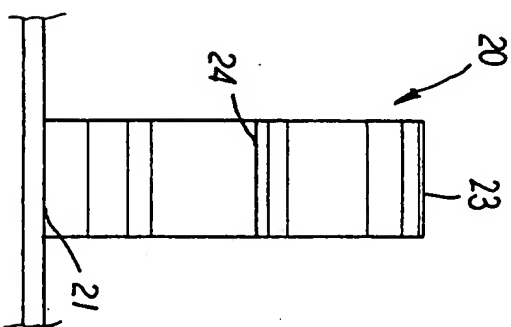


FIG. 2A

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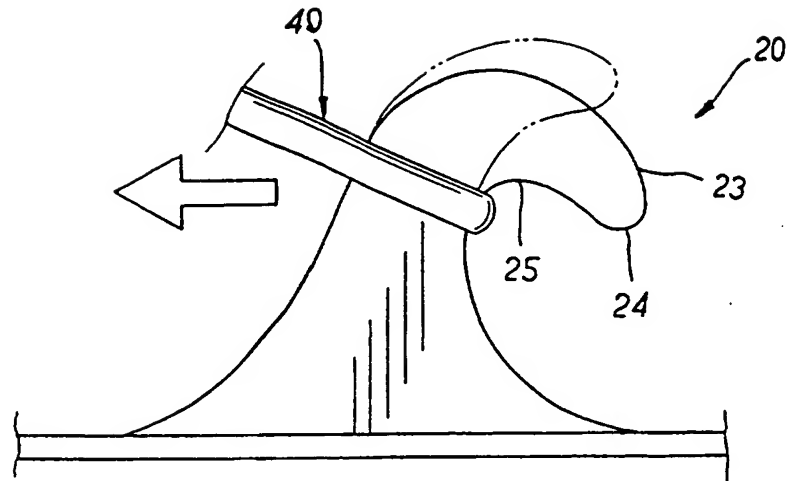


FIG. 2B

PRIOR ART

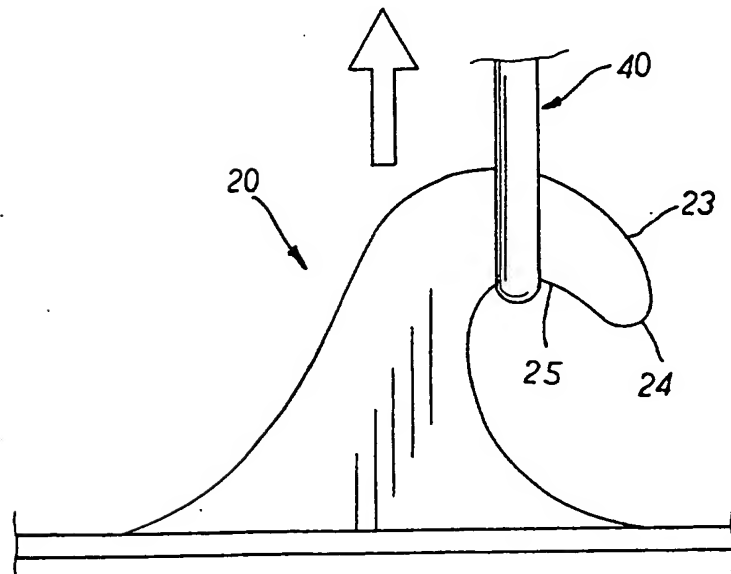


FIG. 2C

PRIOR ART

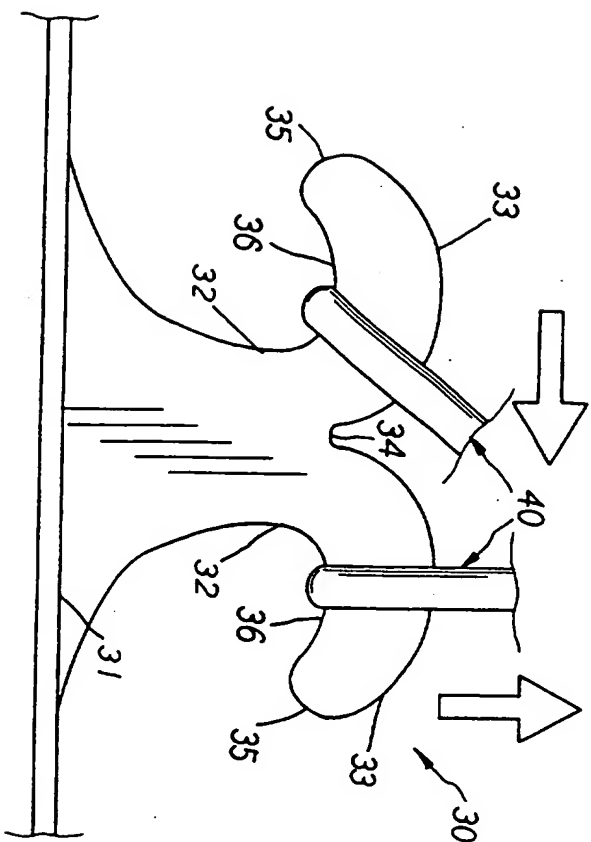


FIG. 3

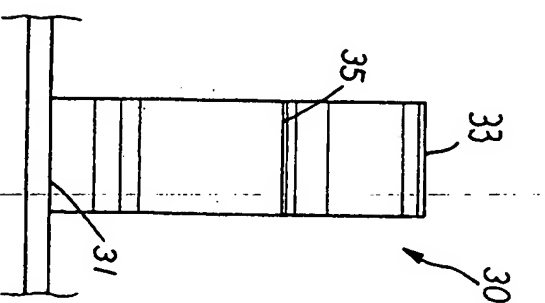


FIG. 3A

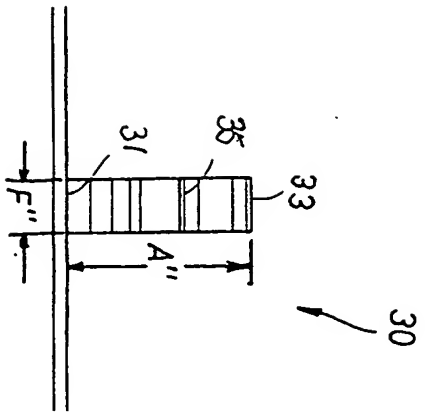


FIG. 4-1

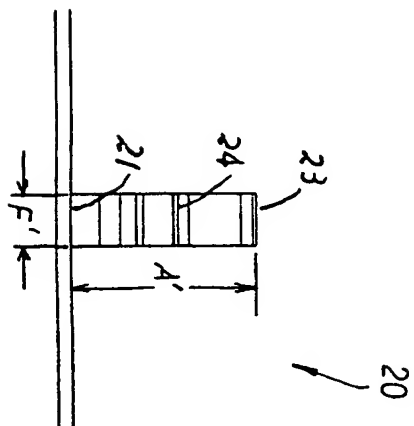


FIG. 4 B-1

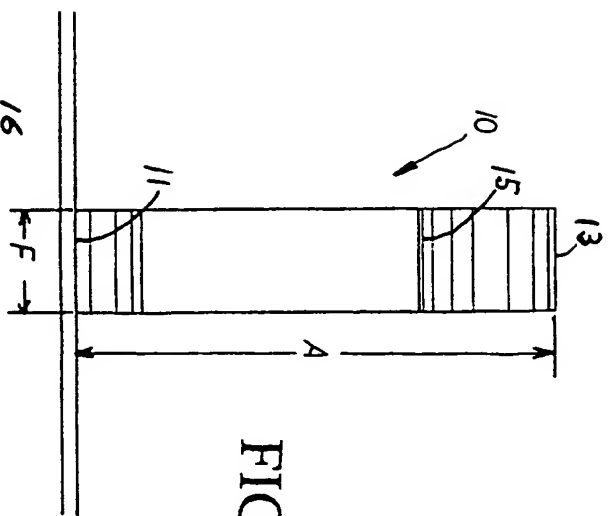


FIG. 4 A-

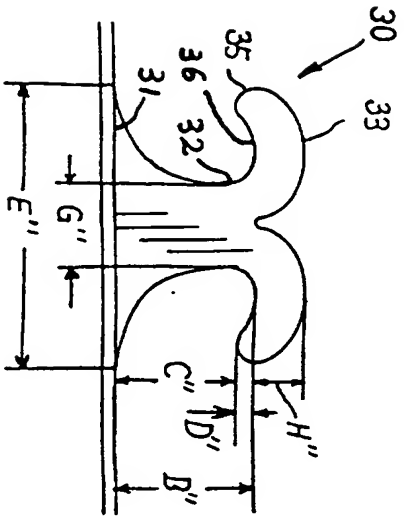


FIG. 4

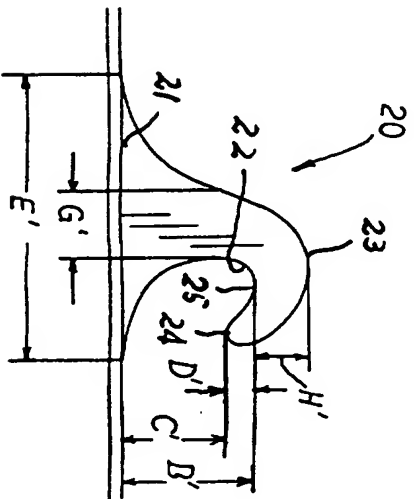


FIG. 4 B

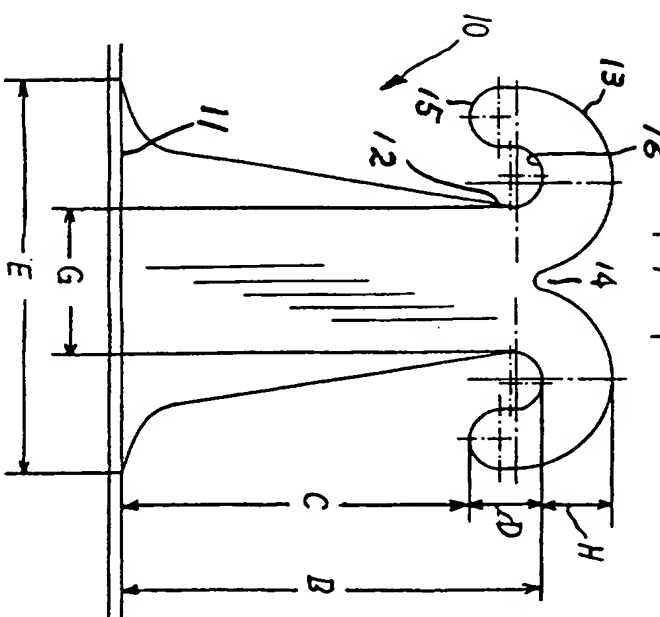


FIG. 4 A

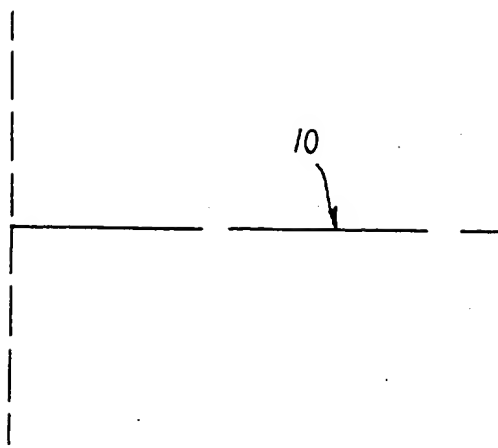


FIG. 5A

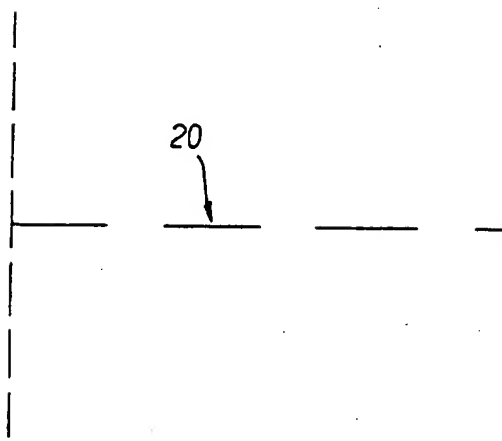


FIG. 5B

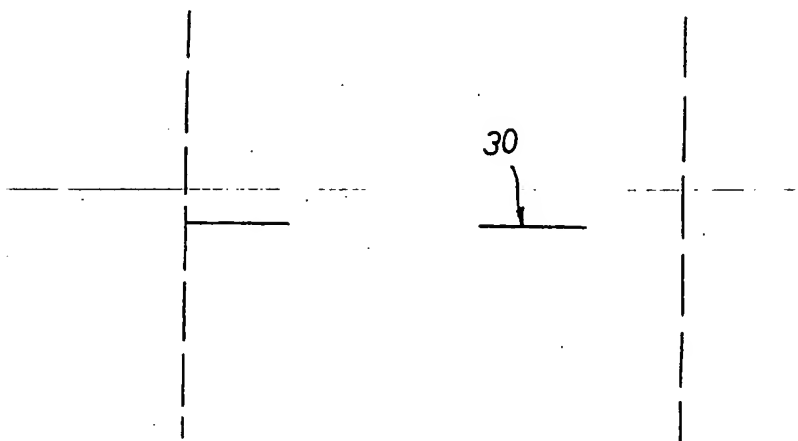


FIG. 5

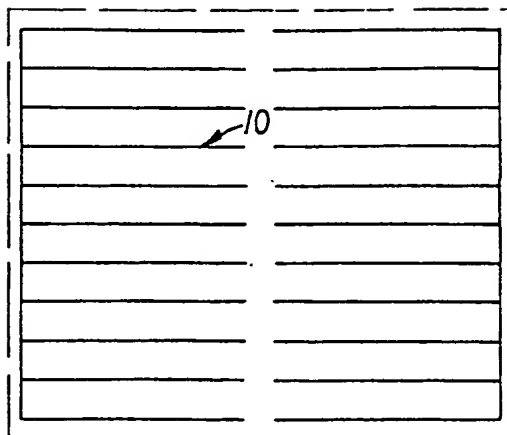


FIG. 6A

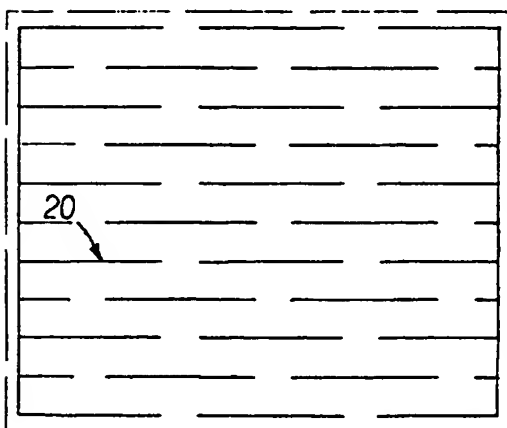


FIG. 6B

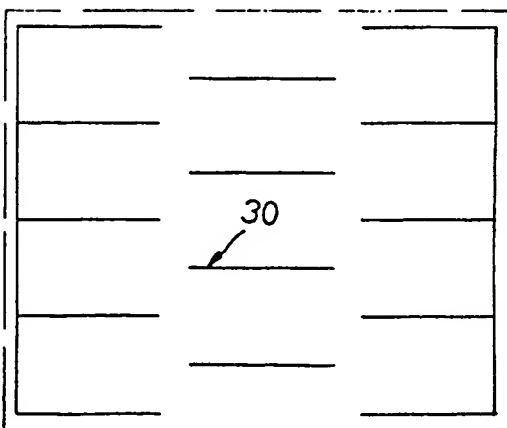


FIG. 6

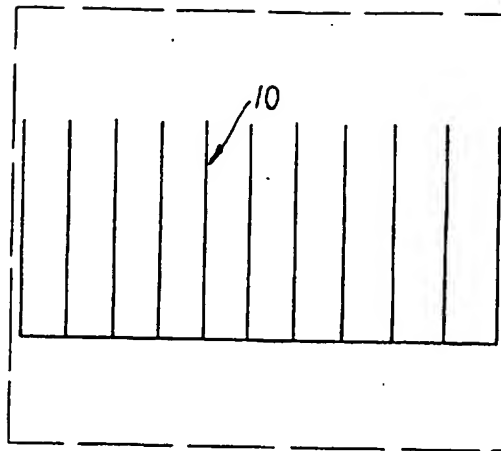


FIG. 7A

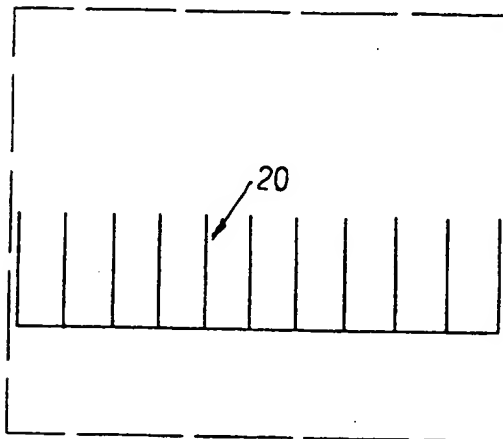


FIG. 7B

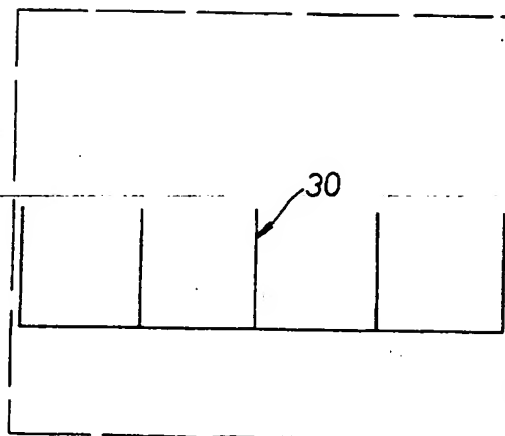


FIG. 7

A HOOK BODY STRUCTURE OF HOOK-LOOP FASTENING BELT

BACKGROUND OF THE INVENTION

The present invention relates to a hook body structure of hook-loop fastening belt in which large amount of loop bodies can be more easily hooked into and detached from the arch section of the hook body. Also, reduced number of hook bodies are arranged on the fastening belt to lower cost. In addition, the hook body has greater transverse pulling strength

Figs. 1 and 1A show the hook body of a conventional hook-loop fastening belt. The hook body 10 is substantially T-shaped and upward tapered from the base 11 to form a neck section 12. Two arch hook sections 13 respectively outward extend from two sides of the neck section 12. An escaping recess 14 is defined between the two arch hook sections 13. The free end of each hook section 13 is formed with a downward arched hook head 15. The lower edge of the hook section 13 is formed as an arch recess 16.

Please refer to Figs. 1 and 4A. The above conventional structure has some shortcomings as follows:

1. The distance D from the top edge of the arch recess 16 to the bottom edge of the arch hook head 15 is larger. When detaching the loop body 40 from the hook body 10, a greater force is necessary for separating the loop body from the

hook body.

2. The arch hook section 13, arch hook head 15 and the arch recess 16 are all designed at a circular center. They have better transverse pulling strength. However, when bound with another loop body 40, it is relatively difficult to hook the loop body 40 into the arch recess 16 of lower edge of the arch hook section 13 by a large amount. As a result, the transverse pulling strength cannot reach a complete strength.
3. The distance A from the base 11 to the top edge of the arch hook section 13, the distance B from the base 11 to the top edge of the arch recess 16, the distance C from the base 11 to the bottom edge of the arch hook head 15, the distance D from the top edge of the arch recess 16 to the bottom edge of the arch hook head 15, the width E of the base 11, the thickness F of the hook body 10, the width G of the neck section 12 and the distance H from the top edge of the arch hook section 14 to the top edge of the arch recess 16 are all larger, so that they require more material and thus the cost is higher.
4. The distance A from the base 11 to the top edge of the arch hook section 13 is relatively high. After the hook body 10 is bound with another loop body 40, the thickness of the fastening belt will be the loop body 40 itself plus the

height A of the hook body 10 itself. Therefore, the thickness is thicker and tends to interfere with external article.

Figs. 2 and 2A show the hook body of another conventional hook-loop fastening belt. The hook body 20 is substantially L-shaped and upward tapered from the base 21 to form a neck section 22. An acute arch hook sections 23 laterally extends from the neck section 22. The free end of acute arch hook section 23 is formed with an acute arch hook head 24. The lower edge of the hook section 23 is formed as a substantially elliptically arch recess 25.

Please refer to Figs. 2B, 2C and 4B. The above conventional structure has some shortcomings as follows:

1. The distance D' from the top edge of the arch recess 25 to the bottom edge of the arch hook head 24 is deeper and the distance H' from the top edge of the arch hook section 23 to the top edge of the arch recess 25 is larger. When detaching the loop body 40 from the hook body 20, a greater force is necessary for separating the loop body 40 from the hook body 20.
2. The distance D' from the top edge of the arch recess 25 to the bottom edge of the arch hook head 24 is deeper so that it is relatively difficult to hook the loop body 40 into the arch recess 25 of the arch hook section 23 by a large amount.

As a result, the transverse pulling strength cannot reach a complete strength.

3. The width G' of the neck section 22 is narrower and is not designed with escaping recess so that the transverse pulling strength of the hook body 20 is weaker. As a result, the loop body 40 tends to separate from the hook body 20 due to greater transverse pulling force.

SUMMARY OF THE INVENTION

It is therefore a primary object of the present invention to provide an improved hook body structure of hook-loop fastening belt in which the top edge of the arch hook section of the hook body is nearly plainly arched and the bottom edge of the arch hook head is also nearly plainly arched so that the distance from the top edge of the arch recess to the bottom edge of the arch hook head is shorter and the distance from the top edge of the arch hook section to the top edge of the arch recess is also shorter, whereby large amount of loop bodies can be more easily hooked into the arch recess of the hook body and less strength is required for detaching the loop body from the hook body. In addition, the hook body has greater transverse pulling strength.

It is a further object of the present invention to provide the above hook body structure in which the arch hook sections on two sides of the hook body are symmetrical to each other. When one arch

hook section is transversely pulled, the other arch hook section serves to offset the transversely pulling force. Therefore, the hook body is able to bear greater transversely pulling force, whereby the loop body will not detach from the hook body due to greater pulling force.

It is still a further object of the present invention to provide the above hook body structure in which the hook bodies are relatively loosely evenly arranged on the fastening belt so that the material of the hook bodies is saved and the manufacturing cost is reduced.

It is still a further object of the present invention to provide the above hook body structure in which the hook body has less height so that after bound with the loop body, the total thickness is thinner and will not interfere with external article.

The present invention can be best understood through the following description and accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view of a conventional hook body of hook-loop fastening belt, showing the pulling force exerted thereon;

Fig. 1A is a side view of the conventional hook body of Fig. 1;

Fig. 2 is a front view of another conventional hook body of hook-loop fastening belt, showing the pulling force exerted

thereon;

Fig. 2A is a side view of the conventional hook body of Fig. 2;

Fig. 2B shows the transversely pulling operation of the conventional hook body of Fig. 2;

Fig. 2C shows that the loop body is detached away from the conventional hook body of Fig. 2;

Fig. 3 is a front view of the hook body of hook-loop fastening belt of the present invention, showing the pulling force exerted thereon;

Fig. 3A is a side view of the hook body of the present invention;

Figs. 4, 4A and 4B show the comparison between the distances and shapes of the respective portions of the present invention and the first and second conventional structures;

Figs. 4-1, 4A-1, 4B-1 show the side views of the present invention and the first and second conventional structure;

Figs. 5, 5A and 5B show the comparison between the intervals and arrangements of the hook bodies on the front face by equal area of the present invention and the first and second conventional structures;

Figs. 6, 6A and 6B show the comparison between the intervals and arrangements of the hook bodies on the lateral face by equal area of the present invention and the first and second conventional structures; and

Figs. 7, 7A and 7B show the comparison between the intervals and arrangements of the hook bodies on the top face by equal area of the present invention and the first and second conventional

structures.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Please refer to Figs. 3 and 3A. The hook body 30 is substantially T-shaped and upward tapered from the base 31 to form a neck section 32. Two nearly plainly arch hook sections 33 respectively outward extend from two sides of the neck section 32. An escaping recess 34 is defined between the two arch hook sections 33. The free end of each hook section 33 is formed with a nearly plainly arch hook head 35. The lower edge of the hook section 33 is formed as a nearly plainly arch recess 36.

The distance from the top edge of the arch recess 36 to the bottom edge of the arch hook head 35 and the distance from the top edge of the arch hook section 33 to the top edge of the arch recess 36 are both shorter. This facilitates hooking and detachment of the loop body 40.

Fig. 4 shows the distances and profiles of the respective portions of the present invention. Figs. 4A and 4B show the comparison between the present invention and the conventional structures.

The distance from the base 31 to the top edge of the arch hook section 33 is denoted as A'' (the first conventional structure is A and the second is A').

The distance from the base 31 to the top edge of the arch recess 36 is denoted as B'' (the first conventional structure is B and the second is B').

The distance from the base 31 to the bottom edge of the arch hook head 35 is denoted as C'' (the first conventional structure is C and the second is C').

The distance from the top edge of the arch recess 36 to the bottom edge of the arch hook head 35 is denoted as D'' (the first conventional structure is D and the second is D').

The width of the base 31 is denoted as E'' (the first conventional structure is D and the second is D').

The thickness of the hook body 30 is denoted as F'' (the first conventional structure is F and the second is F').

The width of the neck section 32 is denoted as G'' (the first conventional structure is G and the second is G').

The distance from the top edge of the arch hook section 33 to the top edge of the arch recess 36 is denoted as H'' (the first conventional structure is H and the second is H').

First, the distances of the respective portions of the present

invention and the first conventional structure are compared with each other as follows:

1. $D > D''$. The hook section of the first conventional structure is arched and suspended, while the hook section of the present invention is substantially plainly elongated and arched. Therefore, with respect to the present invention, the loop body 40 can be more easily detached from the hook body 30.
2. $A, B, C, D, E, F, G, H > A'', B'', C'', D'', E'', F'', G'', H''$. Therefore, the present invention necessitates less material and the manufacturing cost for the hook body 30 is reduced.
3. $A > A''$. The hook section of the first conventional structure is arched and suspended, while the hook section of the present invention is substantially plainly elongated and arched. Therefore, after the present invention is bound with another loop body 40, the thickness of the fastening belt is thinner and not likely to touch and interfere with external article.

Second, the distances of the respective portions of the present invention and the first conventional structure are compared with each other as follows:

1. $B'' > B', C'' > C', D'' < D'$ and $H'' < H'$. The hook section of the second conventional structure is inclinedly suspended and acutely arched, while the hook section of the present invention

is substantially plainly elongated and arched. Therefore, with respect to the present invention, the loop body 40 can more easily get into the arch section 33 of the hook body 30 so that more loop bodies 40 can get into the arch recess 36. Therefore, the transverse pulling force can hardly detach the loop body 40 from the hook body 30.

2. $G'' > G'$. The neck section of the second structure is tapered and upward inclined to one side, while the present invention is gradually enlarged and upward inclined to two sides. Therefore, the transverse pulling strength is stronger and when suffering a transverse application force, the loop body 40 is easy to detach from the hook body 30.
3. $H'' < H'$. The hook section of the second conventional structure is acutely arched, while the hook section of the present invention is substantially plainly elongated and arched. Therefore, the force required for detaching the loop body 40 from the hook body 30 is less.

Figs. 5, 5A and 5B show the comparison between the present invention and the first and second conventional structures with respect to the intervals of the arrangement on front face by the equal area. Equal areas are taken from the respective fastening belts and compared by way of lines. It can be known that the front face of the first conventional structure on the average is arranged with two and a little more hook bodies 10. The front face of the

second conventional structure on the average is arranged with three and a little more hook bodies 20. The front face of the present invention on the average is arranged with two hook bodies 30. Therefore, the present invention can save more material and reduce cost with better fastening effect.

Figs. 6, 6A and 6B show the comparison between the present invention and the first and second conventional structures with respect to the intervals of the arrangement on lateral face by the equal area. Equal areas are taken from the respective fastening belts and compared by way of lines. It can be known that the lateral faces of the first and second conventional structures on the average are both arranged with six hook bodies 10, 20. The lateral face of the present invention on the average is arranged with five hook bodies 30. Therefore, the present invention can save more material and reduce cost with better fastening effect.

Figs. 7, 7A and 7B show the comparison between the present invention and the first and second conventional structures with respect to the intervals of the arrangement on top face by the equal area. Equal areas are taken from the respective fastening belts and compared by way of lines. It can be known that the hook bodies 10 of the first conventional structure are closely evenly arranged with less bottom area. The hook bodies 20 of the second conventional structure are closely and interlacedly evenly arranged with less bottom area. In contrast, the hook bodies 30 of the present invention are relatively loosely evenly arranged with more bottom area.

Therefore, the number of the hook bodies 30 of the present invention is less so that the present invention can save more material and lower cost without reducing fastening effect.

According to the above arrangement, the present invention has the following advantages:

1. The depth D'' is shorter so that more loop bodies 40 can more easily get into the arch recess 36 and it is strength-saving to detach the loop bodies 40 from the hook bodies 30.
2. The arch hook sections 33 on two sides serve to offset the pulling force exerted onto each other. In addition, the hook sections 33 are designed with elongated plainly arched shape so that when suffering transverse pulling force, the loop body 40 is not easy to detach from the hook body 30.
3. The hook bodies 30 are such arranged on the fastening belt as to save material and lower cost.
4. The height A'' is smaller so that after bound with the loop body 40, the total thickness is thinner and not easy to interfere with external article.

The above embodiment is only used to illustrate the present invention, not intended to limit the scope thereof. Many modifications of the above embodiment can be made without departing from the spirit of the present invention.

WHAT IS CLAIMED IS:

1. A hook body structure of hook-loop fastening belt, the hook body being substantially T-shaped and upward tapered from a base to form a neck section, two hook sections respectively outward extend from two sides of the neck section, an escaping recess being defined between the two arch hook sections, said hook body being characterized in that the hook sections of the hook body are arched, a free end of each hook section being formed with an arch hook head, a lower edge of the hook section being formed as a nearly plainly arch recess, a distance from the top edge of the arch recess to the bottom edge of the arch hook head being shorter and a distance from the top edge of the arch hook section to the top edge of the arch recess being also shorter, whereby large amount of loop bodies can be more easily hooked into the arch recess of the hook body and greatly reduced number of hook bodies are arranged on the fastening belt to reduce cost and it is strength-saving to detach the loop bodies from the hook bodies and the hook body has greater transverse pulling strength.
2. A hook body structure of hook-loop fastening belt as claimed in claim 1 wherein the arch hook sections of the hook body are formed with nearly plainly arched faces and the hook heads are also formed with nearly plainly arched faces and the arch recess is formed with plainly arched shape whereby the loop body can be easily hooked into the arch hook section and bound therewith with more strength-saving to detach the loop body from the hook body.



Application No: GB 9924961.7
Claims searched: 1 - 2

Examiner: Paul Nicholls
Date of search: 22 February 2000

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): E2S (SA)

Int Cl (Ed.7): A44B 18/00

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2,291,114 A (YKK) - See figure 2(B)	1
A	EP 0,324,577 A1 (3M) - See figures 1, 3	1
A	US 4,709,453 A (HARVEY et al) - See figure 3	1
A	US 4,169,303 A (LEMELSON) - See figure 8	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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